

**IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF PENNSYLVANIA**

CARNEGIE MELLON UNIVERSITY,)
)
Plaintiff,)
)
v.) Civil No. 09-290
) Judge Nora Barry Fischer
MARVELL TECHNOLOGY GROUP, LTD.,)
and MARVELL SEMICONDUCTOR, INC.,)
)
Defendants.)

MEMORANDUM OPINION

I. INTRODUCTION

Pending before the Court is a Motion for Partial Summary Judgment of Patent Invalidity (Docket No. 318) (“the motion”) filed by Defendants, Marvell Technology Group, Ltd. and Marvell Semiconductor, Inc. (collectively, “Marvell” or “Defendants”). Along with the motion, Marvell filed its Brief in Support and Concise Statement of Material Facts (Docket Nos. 319-320). Plaintiff Carnegie Mellon University (“CMU” or “Plaintiff”) filed its Brief in Opposition, accompanied by its responsive statement of facts and appendix (Docket Nos. 323-325). Defendants then filed their reply brief and reply to CMU’s responsive statement of facts. (Docket Nos. 327-328). CMU also filed a sur-reply. (Docket No. 329). The Court heard oral argument on December 15, 2011¹ and received the transcript on February 23, 2012. (Docket Nos. 332, 336). The Court, having considered the briefing, oral argument and evidence submitted in support of and counter to the pending motion, as well as certain evidence submitted

¹ Plaintiff and Defendants utilized slides at this hearing, and these slides are filed of record at Docket Nos. 333 and 334.

with respect to the previous motion for summary judgment, finds that Marvell's request for partial summary judgment should be DENIED.

II. BACKGROUND

a. Factual Background

The factual background of this case has been described in detail in the Court's previous summary judgment opinion. (Docket No. 306). Because none of the substantive facts have changed, the Court will not repeat those facts here, but will refer to its earlier factual recitation, as necessary. The Court will, however, briefly describe the patents at issue.

CMU alleges infringement of two patents in this case. The first patent, U.S. Patent No. 6,201,839 (the “‘839 Patent”), claims a priority date of May 9, 1997. *See ‘839 Patent at Col. 1, lns. 7-9.* The ‘839 Patent is entitled “Method and Apparatus for Correlation-Sensitive Adaptive Sequence Detection.” *Id.* It issued on March 13, 2001. *Id.* CMU owns this patent by assignment. *Id.*

The second patent, U.S. Patent No. 6,438,180 (the “‘180 Patent”) is a continuation-in-part of the ‘839 Patent. ‘180 Patent at Col. 1., lns. 6-9. This patent is entitled “Soft and Hard Sequence Detection in ISI Memory Channels.” It was issued by the PTO on August 20, 2002. *See ‘180 Patent.* The inventors of this patent are also Kavcic and Moura, and CMU likewise owns this patent by assignment. *Id.* The Court will refer to both the ‘839 and ‘180 Patents collectively as the “CMU patents.”

At issue in this motion are claims 1-5 of the ‘839 Patent and claims 1-2 of the ‘180 Patent. These patents are referred to as the Group I claims.² The present dispute revolves

² The Group II claims, which are not at issue here and were not at issue in the previous motion for partial summary judgment, comprise claims 11, 16, 19 and 23 of the ‘839 Patent and claim 6 of the ‘180 Patent.

around the claim term “function.” Claim 1 of the ‘839 Patent, which is representative of that term’s use in the CMU Patents, claims:

A method of determining branch metric values for branches of a trellis for a Viterbi-like detector, comprising:
selecting a branch metric function for each of the branches at a certain time index; and
applying each of said selected functions to a plurality of signal samples to determine the metric value corresponding to the branch for which the applied branch metric function was selected, wherein each sample corresponds to a different sampling time instant.

‘839 Patent, col. 13, ln. 61 – col. 14, ln. 2.

b. Procedural Background

Because the present motion turns on the scope of the certain claim term, “function,” the Court reviews here its initial claim construction proceedings. Pursuant to Local Patent Rule 4.2, the parties filed their initial “Joint Agreed and Disputed Claim Terms Chart” on January 6, 2010. (Docket No. 74). The Court held a *Markman* hearing on April 12 and 14, 2010. (Docket Nos. 105-106). After the hearing, the parties filed a “Revised Joint Agreed and Disputed Claim Terms Chart.” (Docket No. 120). Following supplemental post-*Markman* briefing, (Docket Nos. 128-130, 135, 138-139), the Court issued its claim construction opinion and order. (Docket Nos. 175-176). In its claim construction opinion, the Court noted that the parties “agree that the [person having ordinary skill in the art (“PHOSITA”)] in this case would be a person with at least a Master’s degree in electrical engineering who had specialized in data detection and signal processing and had at least two years work experience in the industry.” (Docket No. 175 at 10).

It appears that, throughout the Court’s consideration of the claim construction issues, the parties agreed that the term “function” should be given its plain meaning, as would be understood by one of skill in the art. In their initial Claim Terms Chart, the parties used the word “function” in their construction of the term “branch metric function”, stating that “[b]ranch

metric function means a mathematical function for determining a branch metric value for a branch.” (Docket No. 74-1 at 2) (internal quotations omitted). This proposed, agreed-upon construction remained unchanged in the parties’ final Claim Terms Chart. (Docket No. 120-1 at 2). The parties’ use of the word “function” inside the construction of another term which includes “function” indicated to the Court that the parties believed “function” should receive its ordinary meaning. Thus, because the term was not in dispute at the time, the Court did not construe “function” in its initial claim construction opinion.

On September 28, 2011, the Court issued its opinion on Marvell’s previous motion for partial summary judgment. (Docket No. 218). That opinion (Docket No. 306) addressed Marvell’s argument that the Group I claims were invalid for anticipation by U.S. Patent No. 6,282,251 (the “‘251 Patent”). Although it was a close case, the Court found that the ‘251 Patent did not anticipate the Group I claims. (Docket No. 306 at 1).

c. The Court’s Previous Opinion

The instant motion is based on concerns raised by the Court in its previous summary judgment opinion over the scope of the now-in-dispute claim term, “function.” Specifically, Marvell’s current motion addresses a particular paragraph in the prior opinion, which this Court reproduces in its entirety:

Marvell did not advance a construction of the word “function,” other than to say that it should be given its ordinary meaning. (Docket No. 301 at 25). On the other hand, according to CMU, a “function” is “a mathematical relation that uniquely associates members of a first set with members of a second set.” (Docket No. 264 at 5). This is essentially the ordinary meaning of the word “function.” See Merriam-Webster’s Collegiate Dictionary, 507 (11th ed. 2007) (defining “function” as “a mathematical correspondence that assigns exactly one element of one set to each element of the same or another set”). Under this ordinary meaning, which the Court adopts for purposes of this motion since the parties seem to be in agreement, simply adding another variable into a function – here the target value – does not operate to convert that single function into multiple functions.¹⁰

Therefore, variation of the target value does not render Equation 20 of the Seagate Patent a “set” of functions.

(Docket No. 306 at 16). Footnote 10 read:

The Court notes that this reasoning would seem to render the CMU claims invalid under 35 U.S.C. § 112 ¶ 1. It appears that this definition would result in Equation 13 of the ‘839 patent also being considered a *single* function, such that the patent does not teach a set of functions from which one function may be selected. However, as this argument would arise under § 112, and the instant motion is brought under § 102, the Court will not decide the point at this juncture.

(*Id.* at 16 n.10). Marvell latched onto the definition in the parenthetical as the Court’s construction, and based on the issues set forth in the text and associated footnote, brought this motion.

A background to this excerpt is useful. The anticipation dispute in the previous motion revolved largely around two equations, one from the ‘251 Patent and one described in the CMU Patents. Specifically at issue were Equation 20 of the ‘251 Patent and Equation 13 of the CMU Patents:

$$\text{Equation 20: } B_{b,nt} = X_{b,nt}^2 - 2X_{b,nt} \sum_{i=1}^L X_{b,(n-i)t} W_i$$

$$\text{Equation 13: } M_i = \log \det \frac{C_i}{\det c_i} + N_i^T C_i^1 N_i - n_i^T c_i^{-1} n_i$$

See ‘251 Patent at col. 9, ln. 50; ‘839 Patent, col. 7, ln. 3; ‘180 Patent col. 7, ln. 35.³ Both of these equations purport to describe a branch metric. *See* ‘251 Patent at col. 9, ln. 53; ‘839 Patent at col. 5, ln 47.

In its opening brief, Marvell asserted that that the use tap weights, W_i , resulted in the selection of a set of functions as described in the ‘251 Patent. (*See* Docket No. 219 at 13). The

³ For the sake of simplicity, from here on, where both of the CMU Patents make the same disclosure, the Court will only cite to one.

Court rejected this argument because the tap weights did not change for “a certain time index,” but rather, were set at the design stage. (*See* Docket No. 306 at 15). Thus, in analyzing the tap weight theory, the Court found that the ‘251 Patent teaches nothing more than “selection – prior to operation – of a single branch metric function.” (*Id.* at 16).

Marvell also asserted that modification of the target value in the ‘251 Patent resulted in a set of functions. According to Marvell, variation of the target value, $y_{b,nt}$, renders Equation 20 of the ‘251 Patent a set of functions. Although $y_{b,nt}$ does not appear directly in Equation 20, it is incorporated by $X_{b,nt}^2$, which is defined as $X_{b,nt}^2 = (y_{b,nt} - y_{nt})^2$. See ‘251 Patent at col. 4, lns 40-43. The Court likewise rejected this argument, noting that “simply adding another variable” to a function does not automatically render it a set of functions. (Docket No. 306 at 16). In arriving at that conclusion, the Court noted that such reasoning might render the CMU Patents invalid. (*Id.* at n. 10).

The Court intended that its opinion, and particularly footnote 10, call to the parties’ attention the Court’s musings over the scope of the construction the Court had tentatively adopted for the term “function.” Based upon its conclusion that multiple variable elements did not render Equation 20 a “set” of functions, the Court’s concern was that the same reasoning could extend to Equation 13 of the CMU Patents. Specifically, the Court questioned whether the simple addition of variable “tap weights” in the CMU Patents (the covariance matrix, C_i , of Equation 13) would necessarily render Equation 13 a set of functions under the same reasoning that the Court had applied to Equation 20.⁴

⁴ The Court notes that the distinction it drew between the ‘251 Patent and CMU Patents with respect to Marvell’s tap weight theory holds regardless: the question in the previous motion was whether the ‘251 Patent anticipated the CMU Patents. The Court found that the CMU Patents disclosed variable tap weights, while the ‘251 Patent did not. (*See* Docket No. 15-16).

In writing the section of its previous opinion which led to the present dispute, the Court accepted CMU’s position that a function may have two (or more) inputs because this premise was corroborated in textbooks written by Marvell’s expert. (See Docket No. 265-3 at ¶¶ 17, 32). Thus, in the Court’s mind, the target value “variable” did not render Equation 20 a set of functions because the ‘251 Patent’s target value was nothing more than a second input to a single function. *See* ‘251 Patent at col. 4, lns. 39-44, col. 9, lns. 49-51 (stating that $X_{b,nt}^2 = (y_{b,nt} - y_{nt})^2$, where $y_{b,nt}$ is the correct sample and y_{nt} is the actual sample, and incorporating $X_{b,nt}^2$ into the branch metric function, Equation 20). If the Court determined that the tap weight of the CMU Patents was an input, then the reasoning applied to the ‘251 Patent’s target values in the previous opinion would render Equation 13 a single function, and the CMU Patents would lack disclosure of a *set* of functions, as claimed.

With this background in mind, the Court turns now to the legal standard by which motions for summary judgment are determined.

III. LEGAL STANDARD

a. Summary Judgment

“The court shall grant summary judgment if the movant shows that there is no genuine dispute as to any material fact and the movant is entitled to judgment as a matter of law.” FED.R.CIV.P. 56(a). Pursuant to Rule 56, a district court must enter summary judgment against a party “who fails to make a showing sufficient to establish the existence of an element essential to that party’s case, and on which that party will bear the burden of proof at trial.” *Celotex Corp. v. Catrett*, 477 U.S. 317, 322 (1986). “Only disputes over facts that might affect the outcome of the suit under the governing law will properly preclude the entry of summary judgment.” *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242, 248 (1986).

Summary judgment may be granted when no “reasonable jury could return a verdict for the nonmoving party.” *Id.* Therefore, in performing its analysis, a court should “view the evidence in a light most favorable to the opposing party and resolve doubts in its favor.” *Ethicon Endo-Surgery, Inc. v. U.S. Surgical Corp.*, 149 F.3d 1309, 1315 (Fed. Cir. 1998).

b. Written Description Under 35 U.S.C. § 112, ¶ 1

Pursuant to 35 U.S.C. § 112, ¶ 1, a patent’s specification must contain a “written description” of the invention that is sufficiently detailed to “convey with reasonable clarity to those skilled in the art that, as of the filing date sought, [the inventor] was in possession of the invention.” *Carnegie Mellon University v. Hoffman-La Roche Inc.*, 541 F.3d 1115, 1122 (Fed. Cir. 2008) (quoting *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1563-64 (Fed. Cir. 1991)). The written description test “requires an objective inquiry into the four corners of the specification from the perspective of a person of ordinary skill in the art.” *Ariad Pharma, Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1354 (Fed. Cir. 2010) (*en banc*). Although the inquiry under § 112 is fact-intensive, summary judgment is appropriate “where no reasonable fact finder could return a verdict for the non-moving party.” *Atl. Research Mktg. Sys., Inc. v. Troy*, Nos. 2011-1002, 2011-1003, 2011 U.S. App. LEXIS 20208, at 14 (Fed. Cir. Oct. 6, 2011) (quoting *PowerOasis, Inc. v. T-Mobile USA, Inc.*, 522 F.3d 1299, 1307 (Fed. Cir. 2008)). Invalidity must be shown by clear and convincing evidence. *Ariad*, 598 F.3d at 1354.

IV. ANALYSIS

a. Claim Construction

As this Court noted in its claim construction opinion, “[i]t is a ‘bedrock principle’ of patent law that ‘the claims of a patent define the invention to which the patentee is entitled the right to exclude.’” (Docket No. 175 at 3); *see Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed.

Cir. 2005) (en banc) (citing *Innova/Pure Water, Inc. v. Safari Water Filtration Systems, Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2005)). A corollary to this “bedrock principle” is the purpose of the of the written description requirement, which is to “ensure that the scope of the right to exclude, as set forth in the claims, does not overreach the scope of the inventor’s contribution to the field of art as described in the patent specification.” *In re Katz Interactive Call Processing Patent Litigation*, 639 F.3d 1303, 1319 (Fed. Cir. 2011); *see also Univ. of Rochester v. G.D. Searle & Co., Inc.*, 358 F.3d 916, 920 (Fed. Cir. 2004) (quoting *Reiffin v. Microsoft Corp.*, 214 F.3d 1342, 1345 (Fed. Cir. 2000)). Thus, the Court’s construction of the claims is critical to the written description analysis. *See In re Katz*, 639 F.3d at 1319 (stating that “claim construction is inherent in any written description analysis”).

It is within this Court’s power to engage in claim construction, even though the *Markman* hearing and the Court’s claim construction ruling are complete. *Cf. Conoco, Inc. v. Energy & Envt’l Intern., L.C.*, 460 F.3d 1349, 1359 (Fed. Cir. 2006) (“[A] district court may engage in claim construction during various phases of litigation, not just in the *Markman* order.”). Indeed, the United States Court of Appeals for the Federal Circuit has observed that “[d]istrict courts may engage in a rolling claim construction, in which the court revisits and alters its interpretation of the claim terms as its understanding of the technology evolves.” *Guttmann, Inc. v. Kopykake Enterprises, Inc.*, 302 F.3d 1352, 1361 (Fed. Cir. 2002) (citing *Sofamor Danek Group, Inc. v. DePuy-Motech, Inc.*, 74 F.3d 1216, 1221 (Fed. Cir. 1996)).

The Federal Circuit has repeatedly stated that the words of a claim “are generally given their ordinary and customary meaning.” *Phillips*, 415 F.3d at 1312; *see also Toro Co. v. White Consol. Indus., Inc.*, 199 F.3d 1295, 1299 (Fed. Cir. 1999); *Renishaw PLC v. Marposs Societa’ per Azioni*, 158 F.3d 1243, 1249 (Fed. Cir. 1998); *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d

1576, 1582 (Fed. Cir. 1996). This “ordinary and customary meaning” is judged from the vantage of the person having ordinary skill in the art. *Phillips*, 415 F.3d at 1313; *Innova*, 381 F.3d at 1116. This person of ordinary skill⁵ is deemed to read the claim term not only in the context of the particular claim, but in the context of the entire patent. *Phillips*, 415 F.3d at 1313; *Multiform Dessicants, Inc. v. Medzam, Ltd.*, 133 F.3d 1473, 1477 (Fed. Cir. 1998). “In some cases, the ordinary meaning of claim language as understood by a person of skill in the art may be readily apparent even to lay judges, and claim construction … involves little more than the application of the widely accepted meaning of commonly understood words.” *Phillips*, 415 F.3d at 1314.

Although extrinsic evidence is generally less reliable than the patent and its prosecution history, *id.* at 1318, it may be considered by the court. Expert testimony, a form of extrinsic evidence, “can be useful to a court for a variety of purposes, such as … to ensure that the court’s understanding of the technical aspects of the patent is consistent with that of a person of skill in the art, or to establish that a particular term in the patent or the prior art has a *particular meaning in the pertinent field.*” *Id.* (citing *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1308-09 (Fed. Cir. 1999); *Key Pharms. v. Hercon Labs. Corp.*, 161 F.3d 709, 716 (Fed. Cir. 1998)) (emphasis added).

As observed above, the parties defined one term, “branch metric function,” by *using the word, “function,”* in the proposed construction. *See supra* Part II.B. If this was not enough to demonstrate that the parties believed that “function” should be given its ordinary meaning, Marvell clearly stated that the word should be given such a meaning. (*See* Docket No. 301 at 26).

⁵ The parties agreed at the outset of the Court’s earlier claim construction proceedings that “the [person having ordinary skill in the art] in this case would be a person with at least a Master’s degree in electrical engineering who had specialized in data detection and signal processing and had at least two years work experience in the industry.” (Docket No. 175 at 10).

In its previous opinion, the Court, “for purposes of [its ruling on the earlier summary judgment] motion,” construed “function” as “a mathematical relation that uniquely associates members of a first set with members of a second set.” (Docket No. 306 at 16). Upon a deeper review of the patents and the record before it, and with the benefit of additional argument from both sides during the pendency of the instant motion, the Court finds that this tentative construction is appropriate.

Read “in the context of the entire patent,” *Phillips*, 415 F.3d at 1313, the term “function” appears to be used in its ordinary sense, and is not given any special meaning by the patentee. For example, the patent refers to a “likelihood function”, which is followed by Equation 1 of the patent. *See* ‘839 Patent, col. 4 lns. 11-17. The same holds true for the ‘180 Patent. *See, e.g.*, ‘180 Patent, col. 4, lns. 30-34. In both patents, this “likelihood function” is written in standard mathematical notation for function. (*See* Docket No. 265-3 at ¶ 13) (“A function f is often denoted as $f(x) = y$, where x is the argument (or input) and y is the output.”). There are other examples of the word function being used in its ordinary manner. *See, e.g.*, ‘839 Patent, col. 5, lns. 48-53; ‘180 Patent, col. 5, lns. 57-60 (both stating “[t]he metric is a function of the observed samples [and i]t is also dependent on the postulated sequence of written symbols.”).

This construction is also supported by standard English dictionaries from around the time of filing of the CMU patents.⁶ The common thread in each of these definitions is a unique

⁶ *See* THE AMERICAN HERITAGE DICTIONARY OF THE ENGLISH LANGUAGE, 734 (3d Ed. 1992) (defining “function” as “[a] variable so related to another that for each value assumed by one there is a value determined for the other” and “[a] rule of correspondence between two sets such that there is a unique element in the second set assigned to each element in the first set.”); *see also* WEBSTER’S THIRD NEW INTERNATIONAL DICTIONARY OF THE ENGLISH LANGUAGE UNABRIDGED, 921 (1993) (“either of two magnitudes so related to each other that to values of one there correspond values of the other: a correspondence that associates a unique number represented symbolically by $f(x, y, z \dots)$ with every ordered set of numbers $(x, y, z \dots)$ each over its domain.”).

relationship between one “variable” and another, one “magnitude” and another, or one “set” and another. This extrinsic evidence, considered in the context of the intrinsic evidence, makes clear that the adopted construction is in accord with the ordinary meaning of the word “function”. *See Phillips*, 415 F.3d at 1319 (“[E]xtrinsic evidence may be useful to the court, but it is unlikely to result in a reliable interpretation of patent claim scope unless considered in the context of the intrinsic evidence.”).

For the purposes of the invalidity analysis that follows, the Court will address the elements of a function in further detail. CMU seeks to supplement the Court’s understanding of the definition of a function by further describing the types of symbols used in a function. One of their experts, Dr. Gilbert Strang, asserts that “[i]t is impossible to determine whether a given mathematical expression is a single function or a ‘set’ (or family) of functions without reference to the historically recognized common constituent elements of functions.” (Docket No. 325-1 at ¶ 43). Although Marvell asserts that the Court should not pay any heed to the “hyper-technical” terms, and should instead rely on the “general English” construction of function, (*see* Docket No. 327 at 2), the Court observes that its construction is based on the perspective of the person skilled in the art, such that it is proper to consider *their* understanding. Given that the parties have agreed that the person of ordinary skill is someone with a Master’s degree in electrical engineering and at least a few years of experience in the field, the Court believes that terms which it can easily understand fall far short of “hyper-technical.”

So what are these “hyper-technical” terms, and what do they mean? The “argument” is the input(s) to a function and comprises an element of one of the “sets,” the “domain,” of the Court’s construction. (Docket No. 325-1 at ¶ 11.a). The “output” is an element of the other “set,” the “range,” to which the input is uniquely associated. (*Id.* at ¶ 11.b). Like the input,

there may be more than one output. (*Id.*). “Constants” are elements that are neither inputs nor outputs to the function, and whose values do not change. (*Id.* at ¶ 11.c). “Parameters,” like constants, are not inputs or outputs, but unlike constants, parameters may take on different values. (*Id.* at ¶ 11.d).

Of critical importance to the pending motion is CMU’s assertion that parameters simplify description of a “family of functions,” because each value taken by the parameter produces a different function in the family.” (*Id.*). The Court finds that this position is identical to that which Marvell took in its previous motion for summary judgment. At the May 17, 2011 hearing, Marvell presented to the Court as an example its “associated bonus function,” $B_i(x) = c_i \cdot X$, which described a hypothetical equation for determining law firm associates’ annual bonuses. Marvell argued that this equation presented a *set* of functions. (See Docket No. 301 at 26) (“From Marvell’s perspective, we point to the table and we say there are, in fact, six discrete and unique functions that describe the bonus pay for each class in this set.”). Given the notation, it is clear that $B_i(x)$ and X are the sets, but more importantly, Marvell itself referred to the c_i element as a “parameter.” (*Id.* at 25). The slides from that hearing make clear that Marvell took the position that, when the parameter, c_i , of their associate bonus function took on a new value, a new function resulted. (See Docket No. 298 at 21).

Thus, the Court finds that the proper construction of “function,” as used in the CMU patents, and as would be understood by a person of ordinary skill in the art, is “a mathematical relation that uniquely associates members of a first set with members of a second set.” With this construction in mind, the Court turns to Marvell’s invalidity contentions.

b. Invalidity

Having settled upon a construction of the claim term, “function,” the Court is left to determine whether the Group I claims are invalid under 35 U.S.C. § 112, as proposed in Marvell’s current summary judgment motion. Although the Court expressed some concern as to the point in its previous opinion on the first summary judgment motion, the Court believes that, with the benefit of additional argument and explanation, there is at least an issue of material fact that forecloses this Court from finding the claims invalid for lack of written description.

The Court will first address its own concern from the previous opinion before turning to the arguments that Marvell has put forth in its briefing. It is apparent that the Court’s use of the imprecise term “variable” is at the heart of the current dispute. As should be clear from the discussion above, the true issue that the Court raised at Footnote 10 was concern over whether the covariance matrices of Equation 13 of the CMU Patents is an *input* or a *parameter*.

Marvell’s strongest argument on this point – and one the Court had in mind in drafting its previous opinion – was that Figure 3A appears to indicate that σ_i^2 is an *input* to the branch metric computation module. (See Docket No. 336 at 38-39) (Marvell’s argument); *see also* ‘389 Patent at col. 2, lns. 43-44; *id.* col. 7, lns. 39-41; *id.* at Fig 3A. This is critical to the analysis because of Equation 16, which states:

$$\sigma_i^2 = \frac{\det C_i}{\det c_i}$$

Thus, Figure 3A appears to indicate that C_i is an input to the branch metric computation module.⁷

Upon careful consideration, however, the Court finds that C_i is, in fact, a parameter. In arriving at this conclusion, the Court finds the following paragraph critical:

M_i represents the branch metric of the trellis/tree in the Viterbi-like algorithm. The *metric* is a *function* of the observed samples $r_i, r_{i+1}, \dots, r_{i+L}$. It is also dependent upon the postulated sequence of written symbols $a_i-K_i, \dots, a_{i+L}-K_t$, which ensures the signal-dependence of the detector. As a consequence, the *branch metrics* for every branch in the tree/trellis is based on its corresponding signal/noise statistics.

‘839 Patent at col. 5, lns. 47-55; ‘180 Patent at col. 5, lns. 55-63 (emphasis added). Thus, the patents expressly and unambiguously state that the metric is a function of the observed and postulated values. In other words, the inputs to the function are the actual values and target values, just as with the detector described in the ‘251 Patent. *See supra* Part II.C.

If it is not an input, then C_i must be a parameter. Given the above discussion of the elements of a function, it follows that Equation 13 must represent a set of functions since the parameter C_i can alter the relationship between inputs and outputs. Having made this determination, the Court will now address Marvell’s other arguments.

The first argument Marvell puts forth is that, “under the Court’s construction [of the claim term ‘function’], the only Viterbi detectors^[8] disclosed in the CMU patents are designs that

⁷ For clarification, the Court notes that the c_i used in CMU Patents is entirely unrelated to the c_i used in Marvell’s associate bonus function example above. As defined in the CMU Patents, c_i is the “lower principal submatrix of $C_i = [c_i]$.” ‘839 Patent at col. 6, lns. 55-56.

⁸ The Court has defined “Viterbi-like” as “an algorithm that is or is similar to an iterative algorithm that uses a trellis to determine the best sequence of hidden states (in this case, written symbols) based on observed events (in this case, observed readings that represent the written symbols), where the determined sequence is indicated by the best path through the trellis and is

use a single branch metric function across different branches of a trellis.” (Docket No. 319 at 8).⁹ Marvell attempts to couch this argument in the context of the CMU Patents’ specifications by arguing that the various metrics referred to in the patents are all referred to in the singular. (*Id.*).

The Court is not persuaded by this argument. As just described, the Court believes that a person of ordinary skill in the art would understand Equation 13 to represent a set of functions. Moreover, despite Marvell’s argument that no reference is made to multiple functions, the texts of the CMU Patents are directly contradictory to that position. For example, the Patents make clear that

Due to the signal dependent nature of media noise in magnetic recording, the function form of joint conditional [probability density function (“pdf”)] $f(r_1, \dots, r_N | a_1, \dots, a_N)$ in (1) is different for different symbol sequences a_1, \dots, a_N . Rather than making this distinction with more complex but cluttered notation, *the notation is kept to a minimum by using simply the same symbol f to denote these different functions.*

‘839 Patent at col. 4, lns. 24-31 (emphasis added). This simplified notation can be traced throughout the patent, where the “conditional pdf” is represented with the *f* symbol throughout. See, e.g., ‘839 Patent at col. 6, lns. 45-52 (Equation 11). Further, “the branch *metrics* for every branch in the tree/trellis is [sic] based on its corresponding signal/noise statistics.” ‘839 Patent at

determined using branch metric values calculated for branches of the trellis.” (Docket No. 176 at 2).

⁹ The Court notes that Marvell relies on the incorrect construction throughout much of its argument. It claims that the Court construed “function” to mean “a mathematical correspondence that assigns exactly one element of one set to each element of the same or another set.” (Docket No. 334-1 at 3). This is incorrect: the Court adopted the construction described in Section IV.a, *supra*. This misunderstanding, however, is not what is fatal to its arguments because, as the Court observed in its initial summary judgment opinion (Docket No. 306 at 16), that definition, like those cited by the Court above, *supra* note 6, are essentially synonymous with the construction actually adopted by the Court.

col. 5, lns. 53-55. The Court reads these disclosures as describing different functions for different branches.

Next, Marvell argues that the CMU Patents' specifications fail to disclose the "selecting" step recited in the Group I claims. (*See* Docket No. 319 at 10-12). Defendants make the related argument that the provisional application, from which the CMU Patents were derived, failed to disclose the "selecting" step. (*Id.* at 13-14). CMU responds that a person of ordinary skill in the art would understand the disclosures to teach the selecting step. (Docket No. 323 at 14).

The Court finds that CMU's position is sufficient to overcome a motion for summary judgment. The CMU Patents describe how to determine the covariance matrices for each branch. '839 Patent at col. 9, ln. 18 – col. 10, ln. 18; col. 8, lns. 6-23. These matrices can also be stored in memory. *Id.* at col. 3, lns. 45-50; col. 8, lns. 37-39; col. 10, lns. 18-25. The CMU Patents also provide an example of how to identify the proper matrix for each branch at a given time index. *See id.* at col. 10, ln. 44 – col. 11 ln. 10. Particular relevant in that passage is the closing statement: "The matrix [] becomes our estimate of the covariance matrix corresponding to this particular symbol sequence (trellis path) and is used to compute the metrics (13) in the subsequent steps of the Viterbi-like algorithm." *Id.* at col. 11, lns. 7-10. Given the Court's previous discussion wherein the Court concluded that the covariance matrix is a parameter, and different values of a parameter result in different functions, the Court believes that the person of ordinary skill could understand calculation and use of the covariance matrices to describe selection of a function.

c. "Motion for Reconsideration"

Marvell also makes what appears, to the Court, to be a request for reconsideration. The thrust of Marvell's final pair of arguments is that, in order to maintain consistency between its

opinions, the Court must determine that the CMU Patents disclose only a single branch metric function or, in the alternative, if the CMU Patents disclose a set of functions, so too does the ‘251 Patent. (Docket No. 319 at 16-19). The Court has already determined that the ‘251 Patent does not disclose a set of functions in its previous opinion, so this argument, in effect, requests reconsideration of that finding. (*See* Docket No. 306 at 15-16).¹⁰

Motions for reconsideration are granted sparingly “[b]ecause federal courts have a strong interest in finality of judgments.” *Jacobs v. Bayha*, Civ. A. No. 07-237, 2011 WL 1044638, at *2 (W.D.Pa. Mar. 18, 2011). “Because of the interest in finality, at least at the district court level ... the parties are not free to relitigate issues the court has already decided.” *Williams v. City of Pittsburgh*, 32 F.Supp.2d 236, 238 (W.D.Pa.1998) (citing *Rottmund v. Continental Assurance Co.*, 813 F.Supp. 1104, 1107 (E.D.Pa.1992)). The purpose of a motion for reconsideration is ““to correct manifest errors of law or fact or to present newly discovered evidence.”” *Max’s Seafood Café v. Quinteros*, 176 F.3d 669, 677 (3d Cir. 1999) (quoting *Harsco Corp. v. Zlotnicki*, 779 F.2d 906, 909 (3d Cir. 1985)). A Court may grant a motion for reconsideration if the moving party shows: (1) an intervening change in the controlling law; (2) the availability of new evidence which was not available when the court issued its order; or (3) the need to correct a clear error of law or fact or to prevent a manifest injustice. *Max’s Seafood Café*, 176 F.3d at 677 (citing *North River Ins. Co. v. Cigna Reinsurance Co.*, 52 F.3d 1194, 1218 (3d Cir. 1995)).

¹⁰ Section II.M of this Court’s Practices and Procedures states that a Motion for Reconsideration must be filed “within seven (7) days” of the opinion for which reconsideration is sought. *See* http://www.pawd.uscourts.gov/Documents/Judge/fischer_pp.pdf at 5. Although the motion itself was not filed within seven days, Marvell apprised the Court of its intent to file the motion within seven days. (*See* Docket No. 308). Due to the complexity of the issues in this case, the Court will treat the motion for reconsideration as timely-filed as both the Court and the opposing party were on notice of Marvell’s intent to file a supplemental motion.

Marvell evidently relies on the third prong, as it has cited no new evidence or change in law, but argues that one way or another, the Court must construe the law or the facts in its favor.

The Court declines reconsideration. As described above, after reviewing the arguments and evidence offered on the present motion for summary judgment, as well as the parties' positions on the previous motion, the Court is led inexorably to the conclusion that there is a critical distinction between the '251 Patent and the CMU patents. Marvell's target value argument falls flat, as the Court has concluded that target values are inputs to the function, and cannot operate to create multiple functions. As discussed above, both the '251 Patent and CMU Patents are based upon two-input functions, and the target value is an input in both patents. *See* '839 Patent, col. 5, lns. 48-53; '180 Patent, col. 5, lns. 57-60; *See* '251 Patent at col. 4, lns. 39-44, col. 9, lns. 49-51.

Nor does the '251 Patent disclose multiple functions that are selected at a given time index. The tap weights in the '251 Patent are fixed at the design stage. This is the critical distinction between the '251 Patent and the CMU patents: the CMU patents vary the parameters of a given equation, via the covariance matrix, such that they do, in fact, disclose a set of functions that may be selected at a given time index, while the '251 Patent does not.

Given the distinction between the '251 and CMU patents, the Court does not believe it is trapped between "Scylla and Charybdis," as Marvell asserts. Reconsideration is, therefore, denied.

V. CONCLUSION

For the foregoing reasons, and despite its initial concerns, the Court finds that the Group I claims of the '839 and '180 Patents are not invalid under § 112 of the Patent Act. Therefore, Marvell's motion (Docket No. 318) is denied. The parties shall adhere to the schedule already in

place for the remainder of expert discovery, the *final* round of summary judgment motions, and any *Daubert* motions. An appropriate order follows.

s/ Nora Barry Fischer

Nora Barry Fischer

United States District Judge

Date: April 10, 2012

cc/ecf: All counsel of record.